Background and History

of the

Capital Projects

Skill Development Plan

California Department of Transportation
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Contents

1. Executive Summary

The California Department of Transportation ("Caltrans") has begun a three-year skill development plan for its Capital Project employees. Approximately 10,900 Caltrans employees work on Capital Projects.

The plan originated from the Department's 1998 Strategic Plan and it is modeled after Oracle Corporation's Custom Development Method.

Caltrans used a four-phase process to develop the plan:

1. Need Identification

- Caltrans has a "Work Breakdown Structure"(WBS) that defines each of the 491 possible deliverables that can be required for a State Highway project.
- For each WBS deliverable, Caltrans Subject-Matter Experts identified the "roles" that employees play in producing the particular deliverable. Roles are more specific than civil-service classifications. In Caltrans, some classifications perform many roles (one classification, Transportation Engineer, civil, accounts for more than 40 percent of the capital outlay support workforce).
- For Each Role the Subject-Matter Experts identified the knowledge and skills needed to produce the deliverables.

2. Need Quantification

- Teams from seven functional areas developed estimates of the number of current employees in Caltrans who play each role and the degree to which they need training in the knowledge, tool and skill areas. Each number was divided into those that have an urgent need and those that have a moderate need.

3. Plan to Meet Needs

- Courses were designed to address each need. Each design listed the course title, learning outcomes, WBS deliverables, types of employee who need the course, and estimated audience size (subdivided into an urgent and moderate need).
- A total of 579 courses were designed. 337 of these courses are already available and 242 need to be developed. Cost estimates were prepared for the development and implementation of each course.
- Courses were prioritized and approved by each functional program manager, and a plan was developed for Fiscal Year 2000-01. This would provide 303 high-priority courses to meet only the most urgent needs. 162 of these courses are already available. 141 need to be developed.

4. Implementation Plan

- After review and approval by the Business, Transportation and Housing Agency and by the Department of Finance, Governor Gray Davis submitted a Finance Letter to the Legislature. This Finance Letter provides an increase of $12 million and 56 personnel years each year for three years. The Legislature approved this funding, and it is part of the 2000-01 State Budget. The new finance letter increases the commitment to Capital Project skill development from $3.1 Million in 1999-00 to $15.1 Million in each of the next three years.

2. The Caltrans Capital Projects Program

2.1 What is Capital Projects?

Capital Projects is one of the five core programs of the California Department of Transportation. It develops and builds State highways and inter-city rail improvements. Capital Projects provides transportation improvements with an approximate annual value of $4 Billion. One quarter of the program is appropriated to the Department as *Capital Outlay Support*, which funds environmental studies, design, right of way acquisition activities and construction management. The remainder of the program is appropriated as *Capital Outlay*, which funds payments to construction contractors, payments to property owners for real property, and payments to utility companies for the relocation of their utilities.

2.2 Growth

The staff commitment to Capital Projects has grown from approximately 7,000 Personnel Years in 1996-1997 to almost 11,000 Personnel Years in 2000-2001. This growth has occurred in response to an increase in public funding for transportation, such as:

- Governor Gray Davis' Traffic Congestion Relief Plan. The Governor signed this plan in July 2000. It will provide an additional $6 Billion in transportation improvements over six years.

- Redirection of 4.3 cents per gallon in Federal gasoline excise tax to transportation. This produces a permanent increase of approximately $800 million per year in Federal funding for transportation projects in California. It is part of the Transportation Equity Act for the 21st Century, signed by President Clinton in June 1998.

- Doubling of the tolls on the nine bridges in the San Francisco area to help pay for the Bay Bridge replacement. This will produce $907 million in new funding over seven years. This increase was enacted by SB60 of 1997, signed by Governor Pete Wilson in August 1997.

- Passage of Proposition 192, a $2 billion bond measure for seismic retrofit of State Highway bridges. The voters approved this measure in March 1996.

2.3 Challenges

The program growth comes at a time when many of the Department's experienced employees are retiring. These retirements result from a combination of two factors:

- Age profile: In the mid-1990s, a disproportionate number of the Department's employees were of an age where they could choose to retire. This is illustrated in Figure 1.

- Retirement formula: A new retirement formula was introduced on July 1, 1999. The new formula increases the pensions of employees who retire in their mid-50s. It encourages employees to retire earlier than 63, the previous optimum age.

Table 1 and Figures 1 and 2 illustrate how 59 percent of the Capital Project workforce in 1999-2000 had been with the Department for more than three years. A year later, it is projected that this number will decrease to 44 percent. First-year employees will increase from 10 percent of the workforce to 19 percent of the workforce.

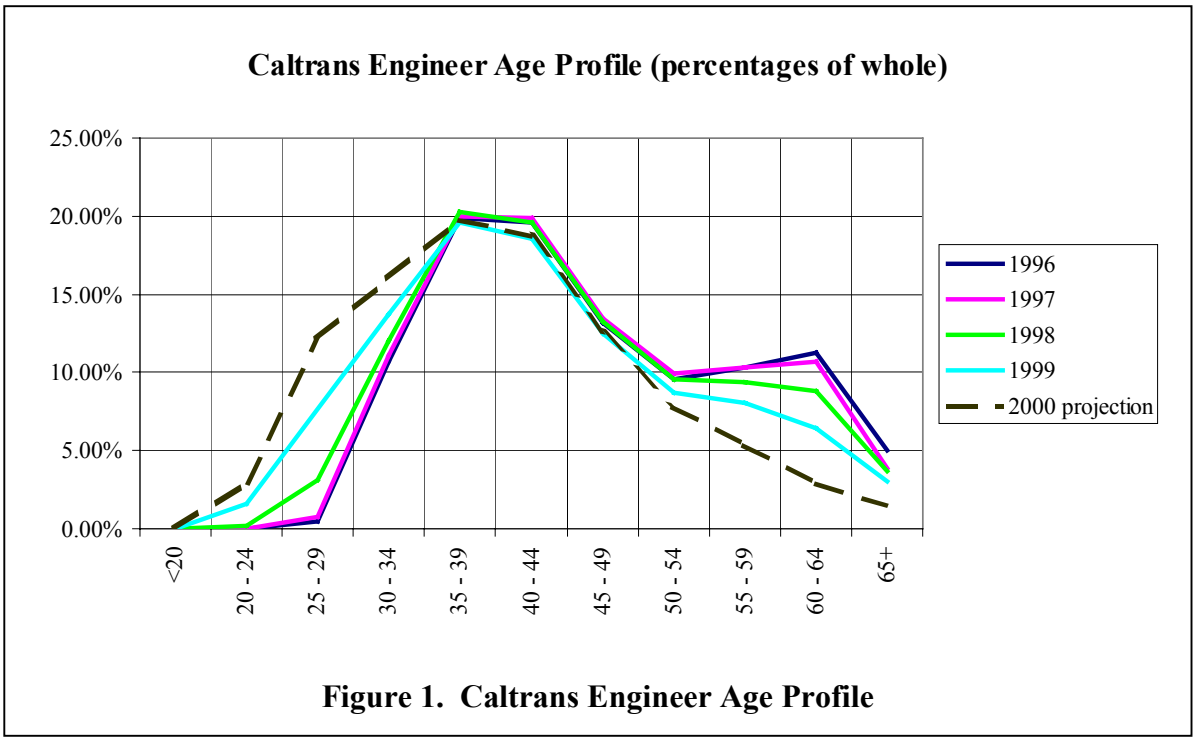

Figure 1. Caltrans Engineer Age Profile

Year	Full Time Positions	Attrition	Attrition Percentage	New hires
1995-96	7,700			
1996-97	7,100	600	8%	**0**
1997-98	6,800	400	6%	**100**
1998-99	9,400	400	6%	**3,000**
1999-00	9,800	600	6%	**1,000**
2000-01	10,900	1,200	12%	**2,300**

Table 1. Caltrans Capital Project Workforce 1995-2001

3. Origins of the Plan

3.1 1997 Strategic Plan

In its 1997 Strategic Plan, Caltrans adopted four goals:

1. Transportation Leadership
2. Capital Improvement
3. Maintenance and Operations
4. Managing Resources

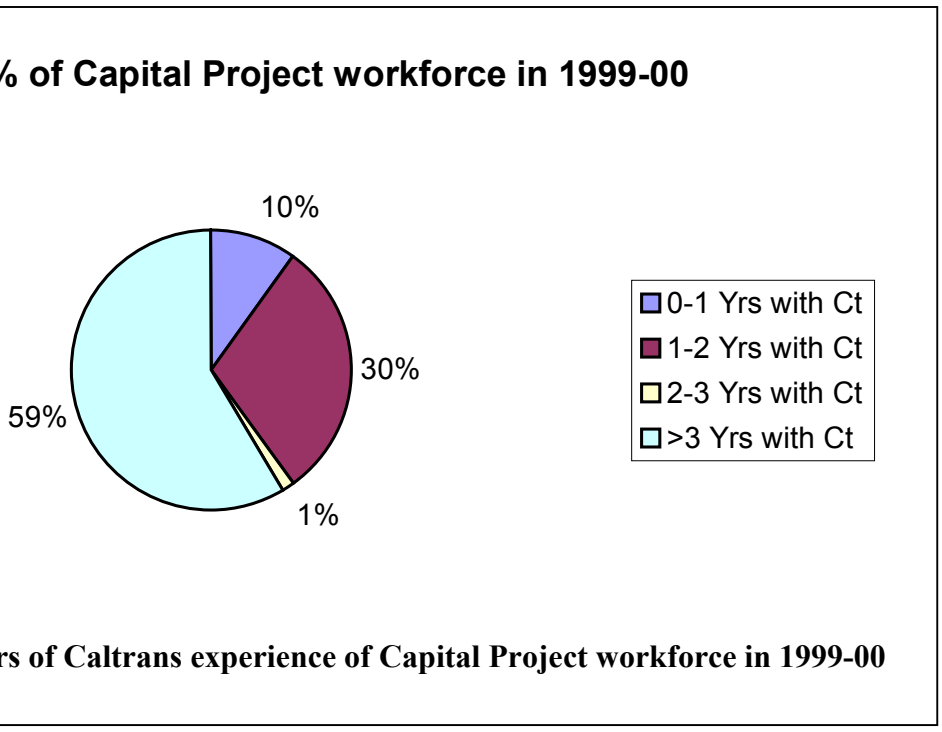

Figure 2. Years of Caltrans experience of Capital Project workforce in 1999-00

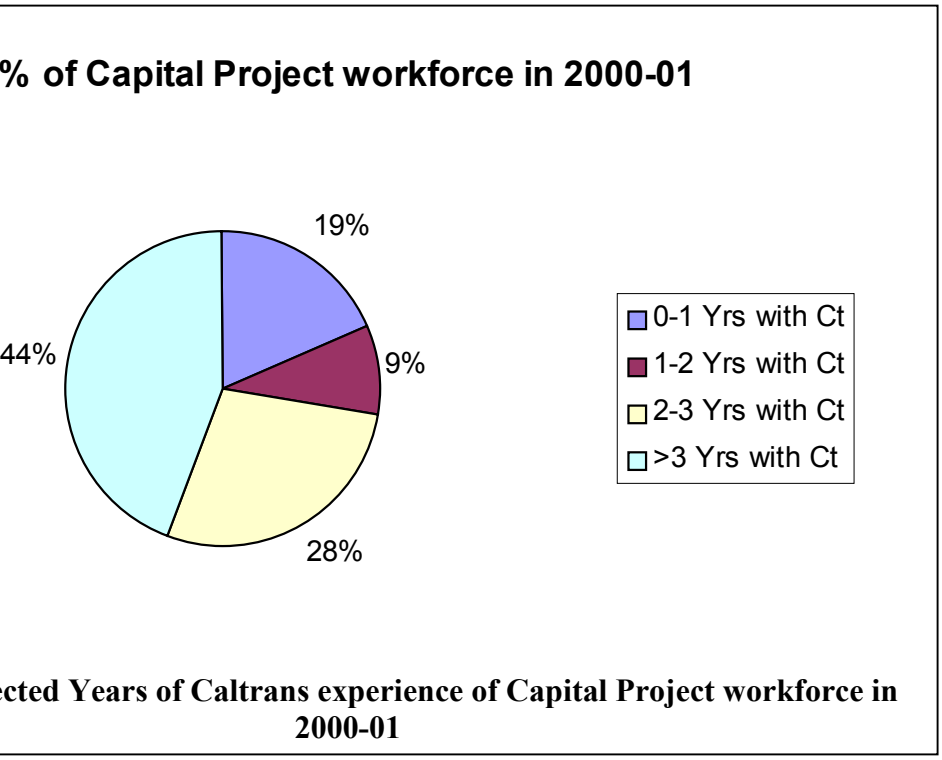

Figure 3. Projected Years of Caltrans experience of Capital Project workforce in 2000-01

For each goal, Caltrans adopted one or two objectives. Goal 4, Objective 2 was to "Enhance and retain a competent, capable and motivated workforce for the future." This objective was further refined into specific annual targets. Three targets for Goal 4, Objective 2 are listed in Table 2.

Year	Target
1997/98	• Provide 20 hours of technical training to all supervisory and front-line employees
1998/99	• Provide 30 hours of technical training to all supervisory and front-line employees
1999/00	• Provide 40 hours of technical training to all supervisory and front-line employees

Table 2. Training targets in the 1997 Strategic Plan

These targets restored Capital Projects' commitment to training. In the early 1990's there was a gradual decrease in training effort as the Capital Projects focused on the immediate delivery of earthquake restoration and seismic retrofit. While it faced these urgent needs, it could not spare the time to send staff to training. The decrease in training was particularly dramatic in 1995, when Caltrans cut staff while maintaining its commitment to project delivery. In that year, Capital Projects allocated only $48 dollars per person to training.

To reach the targets, Capital Projects proposed a budget increase for the 1998-99 Fiscal Year. This increase would provide $1,172,000 per year in new funding for the training of the Department's Capital Project workforce. This was Budget Change Proposal 1B of 1998. The Governor and the Legislature approved this proposal.

BCP1B addressed the needs of the existing Capital Projects workforce. Capital Projects received an additional $642,000 to address the needs of the expanding workforce described in Section 2.3 and Table 1.

	Budget
1995-96 Base (included in the operating expense complement for each PY)	$447,000
1997-98 Contracting-out conversion (Leg 001)	$69,947
1998-99 Training Budget Change (BCP1B)	$1,172,000
1998-99 Finance Letter 3 (PY Increase)	$642,000
TOTAL	**$2,330,947**

Table 3. Capital Project Training Budget in 1998-99

Figure 4 charts the average hours of project delivery training per employee since 1991. The average per-employee commitment to training declined in each year from 1991-92 to 1995-96. In 1998-99 it was restored to the 1991 level. This more than accomplished the targets set in the 1997 Strategic Plan.

3.2 1998 Strategic Plan

The 1997 Strategic Plan was published in July 1997. It pre-dated the growth and challenges described in Sections 2.2 and 2.3. By 1998 these challenges were beginning to materialize. The 1998 Strategic Plan recognized the change and adopted four new Strategic Priorities.

1. Transportation Partnership

2. Developing Our Workforce
3. Integrate Project Management
4. Optimizing Transportation Operations

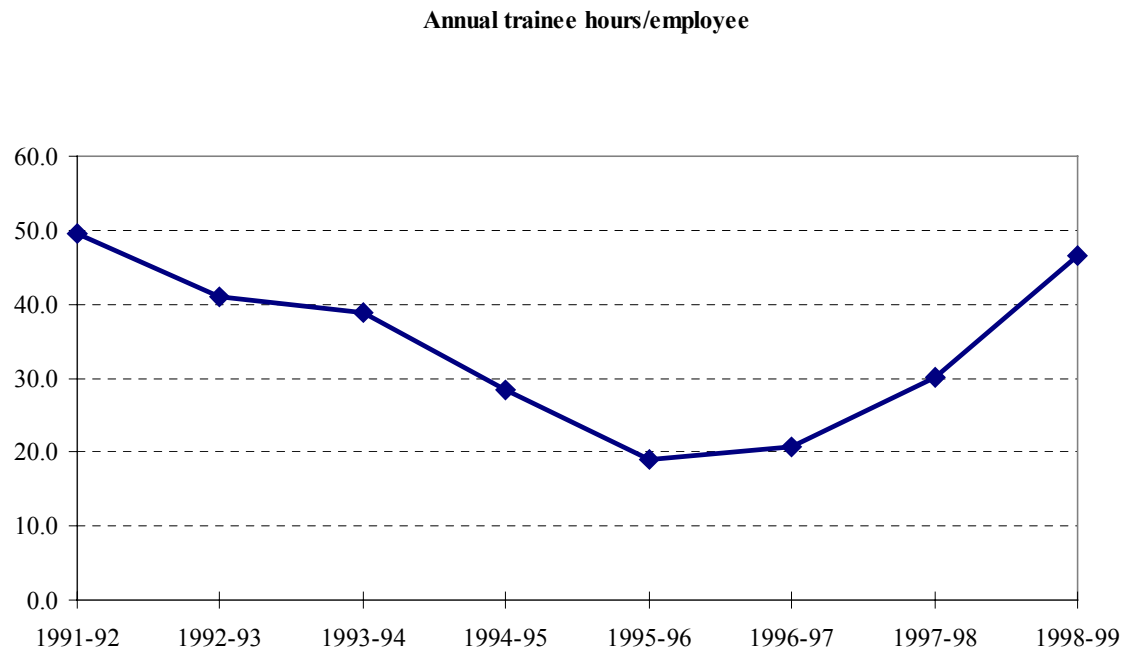

Figure 4. Annual trainee hours per Capital Project employee, 1991 through 1999

As part of the new Strategic Priority 2, the Strategic Plan required each program to develop a skill development plan. Table 4 shows the timeline in the Strategic Plan, with the Capital Project accomplishments.

Year	Action Required by the 1998 Strategic Plan	Capital Project Accomplishments
1998/99	• Identify key skills for Program. • Assess all employees' skills (through management)	• Key skills identified in November 1998 to August 1999 ("Phase1"). • Assessment completed in September to November 1999 ("Phase 2").
1999/00	• Develop 5 Year Skill Plan including employee and consultant skills. • Develop training for areas where skills improvement is needed.	• Plan completed in December 1999 ("Phase3"). • Some development started in January 2000 ("Phase 4"). Full implementation will be underway in 2000/01, with funding from Finance Letter 3 of 2000.

Table 4. Timeline in the 1998 Strategic Plan, with Capital Project Accomplishments

The accomplishments listed n the right hand column of Table 4 are described in greater detail in Section 4.

3.3 Governor's Task Force

The direction adopted in the 1998 Strategic Plan was reinforced by a report in February 1998 by The Governor's 21st Century Training Action Team.[1] This team recommended that:

- "Department directors should develop strategic plans that identify the training requirements associated with strategic objectives and core competencies and assure that training investments are linked to specific strategic outcomes, including employee performance measures.

- "Department training officers should identify specific performance needs for departments based on their department's strategic plans and human resources, as well as training and education planning elements.

- "State supervisors and state employees should identify specific job requirements and performance needs for their departments, and identify appropriate development plans and evaluation methods."

3.4 Little Hoover Commission

Further reinforcement came from a January 1999 report by the Little Hoover Commission.[2] The commission said that:

"State policy makers and program managers need to use training programs to improve the effectiveness of their organizations, to support re-engineering efforts and prepare workers for new assignments.

- "Coordinate efforts. In recent years substantial efforts have been made to coordinate training strategies and opportunities, but the potential benefits for coordination have not yet been realized.

- "Train for change. One skill universally needed in performance-based organizations is the ability to bring about change.

- "Measure benefits. Too often program managers view training as a reward for good workers and a punishment for bad ones. To often policy makers view training as a luxury, easily cut in lean years. But training has the capacity to increase efficiency, allowing departments to do more with less."

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[1] *Developing A High Performance 21st Century Workforce For California Government.* The Governor's 21st Century Training Action Team. February 1998.
[2] *Of the People, By the People: Principles for Cooperative Civil Service Reform.* State of California Little Hoover Commission, January 1999.

4. Development of the Plan

4.1 Oracle Model

In September 1998 a team from Oracle Corporation presented a workshop to Caltrans personnel on the Oracle Custom Development Method.[3] The goal of the workshop was to introduce Caltrans to Oracle's approach to developing databases, but it was immediately obvious that the method had other possible uses in Caltrans. The Oracle method follows three steps:

1. Begin with a Work Breakdown Structure (WBS) that describes to the deliverables needed to produce a database. Oracle has a standard WBS for use in developing databases.
2. Determine what "roles" need to be played to produce each deliverable.
3. Determine what knowledge, tools and skills are needed to perform each role.

As Oracle has a standard WBS for database development, Caltrans has a standard WBS for State Highway improvements. With this common foundation, it was clear that Oracle's method could be applied to Caltrans State Highway projects.

4.2 Project Charter

Mr. John A. Boda, Caltrans Program Manager for Project Management, approved the charter for Project Management Improvement 140 in December 1998. This improvement project was titled "Long Term Training Plan for Capital Projects." It proposed to use the Oracle model to meet the goals listed on the 1998 Strategic Plan. The project had four phases:

1. Need Identification
2. Need Quantification
3. Proposed Course List
4. Implementation Plan.

With the assistance of adult education consultants, Caltrans refined each phase into a hierarchy of deliverables, or "project Work Breakdown Structure." The project WBS is one of the two most essential elements in planning any project.[4] The other is the project charter.[5] The Project 140 WBS appears in Appendix B, and the charter is Appendix A.

4.3 Phase 1: Need Identification

As noted in Section 4.1, the project began from the Caltrans Capital Project Work Breakdown Structure (WBS). The Capital Project WBS is used to plan State Highway improvements. (It should not be confused with the Project 140 WBS, which was used to plan the Long Term Training project).

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[3] *Oracle Custom Development Method*, Oracle Corporation, 1996.
[4] *A Guide to the Project Management Body of Knowledge,* Project Management Institute, 1996, Section 5.3 and Figure 3.5.
[5] *Ibid*. Section 5.1 and Figure 3.4.

A WBS consists of several levels. Each level fully defines and describes the level above it. The project WBS fully defines the products that are required from the project.

At the most detailed level, there are 491 deliverables in the Capital Project WBS. Only the most complex projects require all these deliverables. Most State Highway improvements require a smaller sub-set. If a project has no bridges, for instance, there will be no bridge plans. If no property is needed, there will be no property appraisals. Caltrans revises the WBS each year to account for changing requirements. The fifth edition was published in June 2000.

Appendix C is an example of a WBS deliverable.

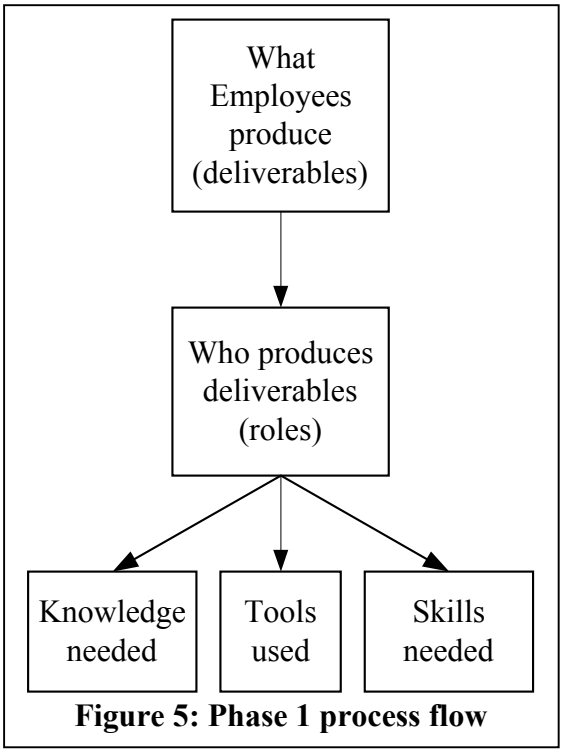

Figure 5: Phase 1 process flow

For each of the 491 deliverables, Caltrans Subject-Matter Experts identified the "roles" that employees play in producing the particular deliverable. Previous attempts at this type of analysis have focused on civil service classifications rather than roles. These attempts have failed because classifications are too general. Roles are more specific than civil-service classifications. The term derives from the theater. Actors play many roles over the course of their careers. Similarly, a State employee may play many roles without changing their civil service classification. For instance:

- Forty percent of the Capital Projects workforce is in a single civil service classification - Transportation Engineer, Civil. They play at least twenty-eight different roles on State Highway projects. Examples include resident engineer, design project engineer, transportation engineer - noise, structures designer, materials inspector, specifications engineer, task manager and traffic engineer.

- In some cases, employees in several civil service classifications play a common role. An example is the role of functional manager (the immediate supervisor of employees who work on the project). All supervisory classifications in Capital Projects play this role.

“Role” is a standard term in the project management arena. Appendix D shows the roles that were identified in Project 140.

For Each Role the Subject-Matter Experts identified the knowledge and skills needed to produce the deliverables and the tools that the employees need to use. Appendix E shows an example of this identification.

Seven team leaders coordinated the identification of roles, knowledge, tools and skills – one for each of the functional areas. The participating functional areas were Construction, Design, Engineering Services, Environmental, Project Management, Right of Way and Traffic

Operations. The work applied only to those portions of each area that are part of Capital Projects. Appendix J lists the participants in this process.

During Phase 1, adult education consultants from the firm of Halley and Associates assisted Caltrans.

4.4 Phase 2: Need Quantification

Teams from the seven functional areas developed estimates of the number of current employees in Caltrans who play each role and the degree to which they need training in the knowledge, tool and skill areas. This was a subjective evaluation by Subject-Matter Experts. Each number was divided into those that have an urgent need and those that have a moderate need. Appendix J lists the participants in this process.

Appendix F is a sample quantification of needs.

During Phase 2, adult education consultants from Cooperative Personnel Services (CPS) assisted Caltrans. They continued to assist the Department in Phases 3 and 4. CPS is a joint powers government agency. The California State Personnel Board and several local agencies in California jointly own this agency.

4.5 Phase 3: Plan to Meet Needs

4.5.1 Designers' Workshop

Caltrans held a one-week Course Designers' Workshop at the Golden State Museum training room in Sacramento in December 1999. In this workshop, Subject-Matter Experts prepared the initial design of courses that would meet the needs that had been identified in Phase 1. They also identified the size of audience for each course, using the data from Phase 2. Each design listed the course title, learning outcomes, WBS deliverables, types of employee who need the course, and estimated audience size (subdivided into an urgent and moderate need).

A total of 579 courses were designed. 337 of these courses are already available and 242 need to be developed. Cost estimates were prepared for the development and implementation of each course.

Appendix G is a sample course design and Appendix J lists the workshop participants.

4.5.2 Finance Letters

In the last week of December courses were prioritized and approved by each functional program manager. A plan was developed for Fiscal Year 2000-01 that would provide 303 high-priority courses to meet only the most urgent needs. 162 of these courses are already available. 141 need to be developed. These courses will provide 608,000 student hours of instruction to 10,900 employees. They are broken into the seven functional areas as follows:

- **Construction:** 43 courses, 139,000 student hours.
- **Design:** 29 courses, 173,000 student hours.

- **Engineering Services:** 105 courses, 108,000 student hours.
- **Environmental:** 83 courses, 89,000 student hours.
- **Operations:** 12 courses, 17,000 student hours.
- **Project Management:** 9 courses, 67,000 student hours.
- **Right of Way:** 22 courses, 15,000 student hours.

Appendix H lists these 303 courses.

The essential character and vision of the plan is product-oriented just-in-time project delivery skill development.

- Product-oriented: The plan is business-driven. Its goal is to ensure that the People of California get the best possible value for the $1 Billion per year that they spend on salaries, benefits, offices, equipment and supplies for the 10,900 Capital Project employees..

  The plan will accomplish its goal by helping employees to produce the 491 Capital Project WBS elements as effectively as possible.

- Just-in-time: The plan will give employees the training they need for their particular task when they need it. Each project consists of many tasks. A particular task may last from less than one day to a few months. Once the task is complete, the employee starts another task, generally on a different project. Most people forget ninety percent of what they learn in the classroom within three days if they do not use the material immediately. Just-in-time training will be given when employees need it, and it will be used immediately to produce specific State Highway products. To accomplish the just-in-time goal, training will shift from the classroom to computer-based training, on the job aids, self-study materials, and structured mentoring.

- Project delivery: The State Highway Account has large cash balance that is earmarked for State Highway improvements. Governor Davis has said "No longer can we afford to hit the snooze button on vital transportation dollars. If we can put those funds to work now, then we can get California moving again." [6] He says:

  "Last year, motorists on California's freeways spent more than 800,000 hours each day in traffic jams at a daily cost of nearly $8 million. Our freeways are anything but free.

  "The more time people spend in clogged commuter corridors, the less productive they are on a daily basis and the less time they have to spend where it matters most – with their families." [7]

[6] State of the State speech, January 5, 2000.
[7] *Ibid.*

To fund this effort, the Governor submitted a Finance Letter to the Legislature. This finance letter, number 3 of 2000, will provide an increase of $12 million and 56 personnel years each year for three years to fund this plan. This funding was approved, and is part of the 2000-01 State Budget. The new finance letter brings the commitment to Capital Project skill development to $15.1 Million, as shown in Table 5.

	Budget
1995-96 Base (included in the operating expense complement for each PY)	$447,000
1997-98 Contracting-out conversion (Leg 001)	$69,947
1998-99 Training Budget Change (BCP1B)	$1,172,000
1998-99 Finance Letter 3 (PY Increase)	$642,000
1999-00 Finance Letter	$800,000
2000-01 Finance Letter 3 Training Operating Expenses	$6,700,000
OPERATING EXPENSE SUB-TOTAL	**$9,830,947**
2000-01 Finance Letter 3 Personnel Services and Related Operating Expenses	$5,300,000
TOTAL	**$15,130,947**

Table 5. Capital Project Training Budget in 2000-01

Figure 6 shows the growth in Capital Projects' financial commitment to skill development.

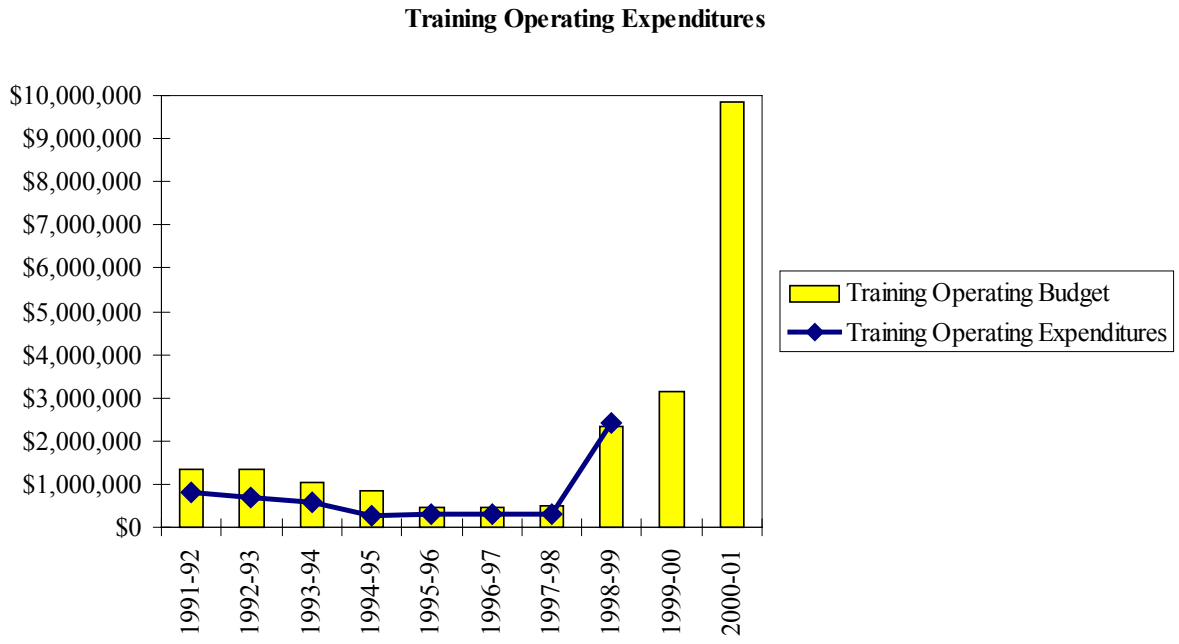

Figure 6. Capital Projects' financial commitment to skill development, 1991-2001

Finance Letter 3 of 2000 provides funding for three years. It is reproduced in Appendix I. In his message to the Legislature, Governor Davis said that this program would be reevaluated after three years.[8]

4.6 Phase 4: Implementation Plan

4.6.1 Instructional System Design

Capital Projects has prepared a six-phase Instructional System Design process for developing and implementing each course. The six phases are:

- **1. Analysis** – determination of training needs
- **2. Cost and Schedule Plan –** course development project plan
- **3. Course Design** – identify learning outcomes, tests and strategy
- **4. Course Development** – creation of supporting courseware
- **5. Implementation** – pilot and regularly deliver learning events
- **6. Evaluation** – assessment of learning events

This process is described in two guides and five workbooks:

- A *Guide to Course Development and Implementation*, which provides the framework for the development and implementation of each course.
- Five Workbooks on the *Instructional Systems Design Process.* There is a workbook for each of the six phases, except Phase 2. Phase 2, the cost and schedule plan, is described in the *Guide to Course Development and Implementation.*
- An *Audit Guide* for evaluating each course.

4.6.2 Evaluation system

Courses will be evaluated using Donald Kirkpatrick's first three levels of training evaluation:[9]

4.6.2.1 Kirkpatrick Level 1 – Course evaluation by students

This is the most common form of course evaluation. Evaluations measure the students' opinion of the class. This is valuable, but it is not an adequate measure on its own. The fact that students enjoyed a class does not necessarily mean that they learned anything.

4.6.2.2 Kirkpatrick Level 2 – Testing of knowledge and skill development

[8] *May Revision to the 2000-01 Governor's Budget.*
[9] *Evaluating Training Programs : The Four Levels* by Donald L. Kirkpatrick, 2nd edition (July 1998) Berrett-Koehler Publishers.

A level 2 evaluation consists of pre-and-post tests to ascertain whether students learned the concepts and skills that the class was intended to teach. If the course is correctly designed, this should lead to improved on-the-job behavior.

4.6.2.3 Kirkpatrick Level 3 – On-the-job behavior changes

A level 3 evaluation consists of on-the-job evaluations of student behavior. These are administered some time after the class was taught. If the course is correctly designed, it should lead to improved on-the-job behavior. Level 3 evaluations are labor-intensive and can be administered only to a sample of students.

4.6.2.4 Other evaluation factors

Kirkpatrick's fourth level measures the improved business outcomes for the organization. Skill development should lead to improved business performance, but this relationship is difficult to prove. Many factors affect the performance of an organization, and not all of them can be addressed through training. The wave of retirements in Caltrans is producing a loss of skills. This can be partially addressed through training, but no amount of training can fully replace a lifetime of experience.

Capital Projects does evaluate its level 4 performance, through an annual report on capital project performance measures.[10]

A fifth level of evaluation, not proposed by Kirkpatrick, is the return on investment. Morrow and others have conducted significant research on this factor.[11]

5. Lessons Learned

5.1 Caltrans staff commitment is essential

The most significant constraint throughout the project was the lack of availability of Caltrans staff, particularly Subject-Matter Experts. Participation by these experts was essential to the project's success. There are several reasons for this constraint:

- Due to attrition, there are fewer qualified Subject-Matter Experts instructors than there were before.

- Subject-Matter Experts need to supervise the large number of employees that Caltrans has hired over the past few years. Therefore, they have difficulty finding time to assist on long-term improvement projects.

- Process improvement projects are an "overhead" cost. The project delivery overhead budget was cut severely in the mid-1990s. As a result, there is very in the budget for improvement projects.

[10] The performance measures were established in the *Report to the Legislature on Capital Support Performance Measures*, November 1995. Caltrans has reported on these measures in each year since 1995.
[11] Charley C. Morrow, M. Quitin Jarrett and Melvin T. Rupinski, "An Investigation of the Effect and Economic Utility of Corporate-wide Training" *Personnel Psychology*, Vol. 50, 1997.

Part of the staff shortage was addressed by redirecting staff from the Office of Project Management Process Improvement. Six of the eight employees in this office were re-directed to work on the project at various times. This is consistent with the mission of the Office "We develop processes, training and tools that help Capital Project employees to produce transportation products as effectively as possible." This fact is borne out by research published by the Project Management Institute. A paper published in 1999 indicates that the top five causes of project delay and cost overruns, in order, are:[12]

1. Low staff experience or skill.
2. Poor clarity and lack of completeness of required specifications.
3. Low Staff morale.
4. Scope changes generated externally to the project.
5. Low availability or experience of supervisors.

This project addresses lack of experience and skill, the most significant cause of overruns and delays. It also contributes to the three of the next four causes – poor clarity and lack of completeness, low morale and supervisor inexperience. All of these can be addressed, to some extent, through an effective training program.

The Office of Project Management Process Improvement attempts partly to address the lack of availability of Subject-Matter Experts by bringing some of those experts onto its own staff. The office combines people with experience in several Caltrans disciplines and it is, to the extent possible, a microcosm of the Caltrans Capital Project functional expertise. By having in-house expertise in a variety of functions, the Office is less dependent on others to provide Subject-Matter Experts.

5.2 Follow the standard project management process

A key to managing the project was to use the proven techniques that are described in *a Guide to the Project Management Body of Knowledge*.[13] Simply stated, this process follows these steps:

1. Adopt a Project Charter.
2. Divide the project into phases.
3. Define the products of the project, using a Work Breakdown Structure (WBS). The phases are the top level of the WBS. Except in an emergency, no work should be performed on a project unless it is in the WBS. Necessary additional work should be amended into the WBS before proceeding.
4. Within each phase, follow five processes:
   - Initiate
   - Plan
   - Execute
   - Control
   - Close

All delays and overruns on the project were a direct consequence of a failure to follow these processes.

[12] Kenneth G. Cooper "Power of the People" *PM Network*, July 1999, page 43.
[13] Project Management Institute, 1996.

5.3 Have a written communication plan

Every project needs a written plan for communicating information to stakeholders. This plan must be updated monthly, and it must be confirmed that all required communications have been completed. Archiving of project information is a particularly important part of the communication plan. The communication plan and archives must match the project WBS. The products listed in each WBS are archived in the part of the archival system that has the same name and number as the WBS element.

5.4 Establish and maintain a glossary of terms

A glossary of terms is a key part of the communication plan. This is particularly important in a project such as this one, which involved people from so many different disciplines. To ensure proper communication, terms should be used only in the sense that they are defined in the glossary.

5.5 Make effective use of consultants

Adult education consultants provided invaluable service on the project. At times, however, project managers allowed them to venture into the area of project management, which was outside their area of expertise. This inevitably led to delays and overruns. The project manager must retain firm control of the project.

Appendices

A. Project Charter

I. PROJECT TITLE AND ID

PIN140. Long-term Capital Project Training Plan

II. PROBLEM STATEMENT

a. What do the customers want to do that they cannot do at present?

Customers want to make the most effective use of the people involved with capital projects.

b. Why is the problem important?

The people of California spend four billion dollars each year on Caltrans capital improvements. They must be sure that they are getting the best possible value for their money.

III. PERFORMANCE MEASURES

How will we know that the project is a success?

Caltrans employees will simultaneously:

- Increase the throughput of capital projects.
- Increase the level of satisfaction of the STIP project sponsors.
- Increase the level of satisfaction of the maintenance and operational forces that receive the products of capital projects.
- Increase the level of satisfaction of the internal customers (e.g. Design, Construction, R/W, Environmental, Engineering Services, and Project Management) who work together interdependently to produce deliverables toward completion of capital projects.

IV. PROPOSED SOLUTION

Description of the Product Scope with enough detail to ensure an understanding of the expected outcome.

A training program that enables employees to meet the goals of this project. This will be a step towards meeting the performance measures.

V. CONSTRAINTS SET BY THE SPONSOR

a. Resource constraints

No new resources are available until the 2000-01 Fiscal Year. The work will be accomplished through the use of staff and consultants funded in the 1998-99 year.

b. Schedule constraints

1. Research and recommend improvements by May 31, 1999.
2. Obtain long-term resources by June 30, 2000.
3. Implement long-term recommendations by June 30, 2001.

c. Other constraints

Recommendations must be in sufficient detail to provide the information needed for an initial training program without new resources and for long-term Budget Change Proposals.

VI. STAKEHOLDERS

a. Customers (who needs the product?)

All employees who work on Capital Projects.

b. Customer Representatives (individuals who will review the proposals to ensure that they meet customer needs).

The project manager will adopt a "fish bowl" approach to customer communications. He will report at least once per month to all customers who wish to be informed about the progress of the project. This will be done by e-mail. The report will be sent to every customer who asks to be added to the e-mail distribution list. As a start, the project manager will ask each of the following managers to assign a person to receive the reports:

- Each District Division Chief of a Capital Project function (Environmental, Design, Engineering Services, Right of Way, construction and Project Management).
- Each Engineering Service Center Office Chief of a Capital Project function.

c. Regulators (Apart from the sponsor, who will need to approve various steps in the project execution?)

Deputy Directors for Project Development and Administration; Director of the Administrative Service Center; Corporate Environmental, Design, Right of Way, Construction and Budget Program Managers.

d. Team Members (Whose help will be needed to produce the product?)

Six teams will perform the work. Each team will include staff from corporate programs, the districts and the engineering service center (if appropriate). Teams will be assigned particular Work Break Down Structure (WBS) products. They will identify the roles that must performed to produce their WBS products, and the training needed for those roles. Teams may establish sub-teams for the lower levels of the WBS. Team leaders are:

- Osama Hassoun – Construction, WBS 270, 285, 290, 295
- Xiomara Balladares – Right of Way, WBS 200, 225, 300
- Gene Berthelsen – Design, WBS 150, 160, 185, 190, 230, 255
- Rich Weaver – Environmental, WBS 165, 175, 180, 205, 235
- Norman Root – Engineering Services, WBS 210, 215, 220, 240, 250, 260, 265
- Hossein Rostam – Project Management, WBS 100

The team will need assistance and support from the Office of Staff Development and Administrative Support in the Administrative Service Center and from a training consultant.

e. Sponsor (signs the Charter)

APPROVED: _____ Date: / /98

JOHN A. BODA
Program Manager for Project Management

f. Sponsor Representative (signs the Charter)

SIGNED: _____ Date: / /98

NIGEL BLAMPIED

g. Project Manager (signs the Charter)

SIGNED: _____ Date: / /98

HOSSEIN ROSTAM

B. Project 140 Work Breakdown Structure

1. Knowledge Tools and Skills needed by each Role to produce each Capital Project WBS element

1.1 Plan

1.1.1 Criteria for selection and formation of six Caltrans Teams in Construction, Design, Right of Way, Envir'l Eng'g, Eng'g Service Center, and Project Management (Functional Teams).
1.1.2 Outline of Project's plan of action.
1.1.3 Functional area workplans.
1.1.4 Detailed project plans.

1.2 Roles in each Function

1.2.1 Initial Role Identification
1.2.2 Role Definition
1.2.3 Reconciliation of similar roles in different functions

1.3 Knowledge, Tools and Skills

1.3.1 Initial Knowledge, Tool & Skill Identification
1.3.2 Knowledge, Tool & Skill Definition
1.3.3 Reconciliation of similar Knowledge, Tool & Skill items for different roles

2. Estimate of number of people needing each course, and the urgency of their need

2.1 Estimate of Number of current employees Needing Each Course, and the urgency of their need

2.1.1 Data Collection tools for estimating current needs
2.1.2 Supervisor surveys or other form of data collection
2.1.3 Number of current CT Employees needing each knowledge / tool /skill

2.2 Prioritized List of Learning Needs

2.2.1 Capital Projects 2000-01 Workload by WBS level 5 element
2.2.2 Number of 2000-01 employees needing each knowledge / tool /skill
2.2.3 Prioritization of learning needs, based on Workbooks and urgency of need

3. Schedule of courses with definitions and objectives associated with the identified learning needs with recommended delivery methods, with cost estimates

3.1 Developers' Workshop Plan

3.2 Developers' Workshop

3.2.1 Names of the courses or modules that will provide each knowledge, tool or skill, with their G Numbers
3.2.2 List of Courses with potential Delivery Methods
3.2.3 Cost Estimate for each potential course
3.2.4 Target Population Analysis for training needs

3.3 Long-term Plan identifying:1. Number and Type of Courses 2. Number of people to be trained by location and class time 3. Number of Trainers/Course Developers and hours required (CT and Outside) with cost estimates

3.4 Finance Letter

4. Implementation Plan

4.1. Plans for the Implementation Plan

4.1.1. Cost and Schedule Plan

4.1.2. Staffing Plan
4.1.3. Communication Plan
4.1.4. Procurement Plan
4.1.5. Facilities Plan
4.1.6. Equipment and Software Procurement Plan

4.2. Execution

4.2.1. Staffing
4.2.1.1. Organizational Structure
4.2.1.2. Hiring
4.2.1.2.1 Hiring Plan
4.2.1.2.2. Knowledge, Tools and Soft skills needed by new hires – Completed Workbooks
4.2.1.2.3. Job Descriptions
4.2.1.2.4. Advertisement
4.2.1.2.5. Selection
4.2.1.2.6. Appointment/Hiring
4.2.1.2.7. Probation Report
4.2.1.3. Policies and Procedures for New unit
4.2.1.4. Training Plan for New Hires
4.2.2. Communication
4.2.2.1. Course Database
4.2.2.2. Master Catalog by WBS, RBS and Roles
4.2.3. Consultant Procurement
4.2.3.2. Identify Consultant skills needed for process -- Completed Workbooks
4.2.3.3. Identify Caltrans internal consulting capabilities
4.2.3.4. Develop integration plan and process for consultants to integrate onto design teams
4.2.3.5. Hire Consultants
4.2.4. Facilities
4.2.5. Equipment and Software Procurement
4.2.5.1. Training and Development Library
4.2.5.2. Training Management Software
4.2.5.3. Designers Edge Software
4.2.5.4. Training on Designer's Edge Software
4.2.5.5. Caltrans Tailored Forms within Designers Edge Software
4.2.5.6. Research on Caltrans System capabilities
4.2.5.7. Database ties to accounting, PeopleSoft and training management software

4.3. Verified Course Designs

4.3.1. Audit Guide
4.3.2. Audit of Initial Course designs
4.3.2.1 Basic Audit of work to be completed on courses identified in workshop with a plan of correction
4.3.2.2 Complete audit of courses
4.3.2.3. Comparison to Vision ("Product-oriented just-in-time project delivery training")

4.3.2.4. Determination whether courses can have immediate delivery (7/1/00), inclusion in training plan as is, candidate for conversion.

4.3.2.5. Adherence to Adult learning principles

4.3.2.6. Effective use of technology

4.3.3. Updated Course Designs

C. Sample Capital Project WBS Deliverable

100 Project Management

The management of the project from initiation through completion. The services provided include initiation, planning, execution, control, and close out of projects.

100.05 Project Management - PID Phase

The management of the PID phase from initiation through completion. The services provided include the initiation and planning of the project, and the execution, control, and close out of the phase.

100.05.05 Project Initiation and Planning

The process of formally recognizing that a new project exists and developing the plan to guide its execution and control. This plan should cover the PID phase in detail, while the remaining phases of the project are planned at a summary level. These will each be planned in detail during Phase Planning (i.e., rolling wave planning).

Sub-tasks:

- Assign project manager.
- Establish expenditure authorization (EA) for Phase K.
- Develop charter for PID. This document should identify the purpose and need for the project, the type of PID to be developed, possible funding source(s), constraints, and assumptions. It should incorporate by reference any agreements with the sponsors (local agencies, maintenance, etc.).
- Enter project into project management database system(s) (XPM, PMCS, etc.).
- Develop Workplan (resourced schedule). Includes the projects scope, cost, and schedule elements.
- Develop Quality Management Plan.
- Develop Communication Management Plan.
- Develop Risk Management Plan.
- Develop Resource Management Plan (staff and procurement).
- Work agreements for staff resources for the PID phase.
- Scope of work for procurement of A&E contracts/agreements for the PID phase.

End Product:

Project Management Plans (detailed for PID phase, summary for the remaining project phases).

D. Roles played by Caltrans employees in delivering State Highway Projects

Construction Roles
Construction Assistant Engineer
Construction Office Assistant
Construction Office Engineer
Construction Surveyor
Construction Technical Support
Resident Engineer
Construction Senior Engineer

Design Roles
Design Assistant Project Engineer
Design Senior
Design Technician
Design Project Engineer

Environmental Planning Roles
Engineering Geologist
Environmental Planner - Arch. History
Environmental Planner - Archaeologists
Environmental Planner - Generalist
Environmental Planner - Natural Sciences
Environmental Planner – Supervision/Mgmt
Transportation Engineer - Noise

Engineering Services Roles
Architect
Chemical Testing Technicians
Construction Bridge Representative
Electrical Engineer
Electrical Testing Technicians
Engineering Geologist
Field and Laboratory Testers
Foundation Driller
Geotechnical Engineer
Materials Inspectors
Materials and Research Engineer
Mechanical Engineer
Pavement Design Engineers
Pavement Testing Technicians
Photogrammetrist
Quality Assurance Staff
Railroad Agreement Engineer
Right of Way Engineer
Specifications Engineer
Structures Designer
Structures Detailer
Structures Estimator
Structures Hydraulic Engineer
Surveyor

Project Management Roles
Assistant Project Manager
COMSO (Project Scheduler)
Contract Manager
Functional Coordinator
Functional Manager
Project Manager
Project Sponsor
Project Team (Staff)
Single Focal Point (SFP)
Task Manager

Right of Way Roles
RW Acquisition Agent
RW Appraiser
RW Planning and Management Agent
RW Property Manager
RW Relocation Assistance Agent
RW Utility Coordinator

Traffic Engineering Roles
Electrical Engineer
Traffic Project Engineer
Traffic Engineer

E. Sample Knowledge/Tools/Skills

Role

PM Project Manager

The project manager is responsible for producing the desired transportation improvement, meeting schedules, staying within budget and satisfying the project sponsor and customers. The project manager retains these responsibilities over the entire life of the project. She or he does not supervise staff with a few exceptions. The project manager is the individual responsible for managing a project and is the primary point of contact for the project sponsor. Project managers are responsible for the planning and performance of individual projects.

	Knowledge Used	*Knowledge Preferred Prior to Employment?*	*Frequency / Duration*	*Essential Knowledge?*
1	Alternative Resource Availability	No	High	Yes
2	Available Information Distribution System	No	High	Yes
3	Budgeting Process	No	High	Yes
4	Charging Practices	Yes	High	Yes
5	Charter Process	No	High	Yes
6	Close EA & Databases and Archive	No	High	No
7	Communication and Distribution of project Records	Yes	High	Yes
8	Communication Management Plan Process	Yes	High	Yes
9	Corrective Action	Yes	High	Yes
10	Database Uses and Information Needed	No	High	Yes
11	EA Process	Yes	High	Yes
12	Earned Value	Yes	High	Yes
13	Estimating Support	Yes	High	Yes
14	Evaluations, Lessons Learned, & Close-Out Report	Yes	High	Yes
15	Internal / External Reporting Requirements	No	High	Yes
16	Organization Structure	No	High	Yes
17	Organizational Structure	No	High	Yes
18	Organizational Structure	Yes	High	Yes
19	Performance Measures	Yes	High	Yes
20	Problem ID	No	Medium	No

F. Sample Quantification of Needs

Role	Role Definition
PM Project Manager	The project manager is responsible for producing the desired transportation improvement, meeting schedules, staying within budget and satisfying the project sponsor and customers. The pr manager retains these responsibilities over the entire life of the project. She or he does not supervise staff with a few exceptions. The project manager is the individual responsible for mana project and is the primary point of contact for the project sponsor. Project managers are responsible for the planning and performance of individual projects.

	Number of People who perform this Role								
	D03	D04	D06	D07	D08	D11	D12	ESC	Total
0-1 Year Experience	8	10	5	14	6	3	2		48
1-3 Years Experience	4	10	13	10	7	3	3		50
3-5 Years Experience	4	10		5	1	3	3		26
5+ Year Experience	4	10	3		1	3			21
Total	20	40	21	29	15	12	8		145

	Number of People Urgently Need Training										Number of People Who Have a Moderate Need for Training										Number of People Who Have Little or No Need For Training									
	D03	D04	D06	D07	D08	D11	D12	ESC	Total	% Total	D03	D04	D06	D07	D08	D11	D12	ESC	Total	% Total	D03	D04	D06	D07	D08	D11	D12	ESC	Total	% Total
Knowledge Needed																														
Alternative Resource Availability						4			4	**3%**						4			4	**3%**	20					4			24	**94%**
Available Information Distribution System	20					4			24	**17%**						4			4	**3%**						4			4	**81%**
Budgeting Process	10								10	**7%**	10			29	15	6			60	**41%**						6			6	**52%**
Charging Practices	20			29	15	6			70	**48%**																6			6	**52%**
Charter Process	20		10				8		38	**26%**			11						11	**8%**						12			12	**66%**
Close EA & Databases and Archive	20			29	15	4	8		76	**52%**						4			4	**3%**						4			4	**45%**
Communication and Distribution of project	20		21	29	15	4			89	**61%**						4	8		12	**8%**						4			4	**30%**
Communication Management Plan Process	20		21	29	15				85	**59%**						6			6	**4%**						6			6	**37%**
Corrective Action											20			29	15	6			70	**48%**						6			6	**52%**
Database Uses and Information Needed	10	40		29	15	6			100	**69%**	10					6	8		24	**17%**										**14%**
EA Process	20								20	**14%**				29	15	6			50	**34%**						6			6	**52%**
Earned Value	20	40	21	29	15				125	**86%**						6	8		14	**10%**						6			6	**4%**
Estimating Support	20	40		29	15	6			110	**76%**																6			6	**24%**
Evaluations, Lessons Learned, & Close-Out	20						8		28	**19%**				29	15	6			50	**34%**						6			6	**46%**
Internal / External Reporting Requirements	20		21			6			47	**32%**				29	15	6	8		58	**40%**										**28%**
Organization Structure														29	15				44	**30%**	20					12	8		40	**70%**
Performance Measures	20			29	15				64	**44%**						6	8		14	**10%**						6			6	**46%**
Problem ID	20			29	15				64	**44%**																12			12	**56%**
Procurement Laws	4								4	**3%**						6			6	**4%**	16					6			22	**93%**
Procurement Management Plan Process	20								20	**14%**						6			6	**4%**						6			6	**82%**
Program Coding	20								20	**14%**	10					6			16	**11%**						6			6	**75%**
Process	20								20	**14%**				29	15	12	8		64	**44%**										**42%**
Process		20	21						41	**28%**		20				12	8		40	**28%**										**44%**
Project Change Request (PCR) Process	20	20	21	29	15	4			109	**75%**		20				4			24	**17%**						4	8		12	**8%**

G. Sample Course Design

COURSE TITLE: **(name course is to be known by, listed as, otherwise referred to)**

Introduction to Project Management (Project Management I)

LEARNING OUTCOME: **(brief, generalized statement of purpose; approximately 25 words)**

"The purpose of the introduction to project management course is to enable project manager and other project team members to learn basics of management of Caltrans State highway projects or projects administered by a local agency for joint or local funded projects."

WBS ELEMENTS THIS COURSE PREPARES YOU TO PRODUCE **(by code):**

100.05.20	*Problem ID (Problem Statement, Purpose & Need, Funding, Constraint*
100.05.30	*Plan (Project Management Plan)*
100.15.10	*Charter*
100.15.20	*Project Workplan*
100.15.30	*Communication Management Plan*
100.15.40	*Risk Management Plan*
100.15.50	*Procurement Management Plan (Resource Management Plan)*
100.25.10	*Project Status*
100.35.30	*Evaluation, Lessons Learned and Archive Project Management Files*

ROLES/PERSONNEL WHO SHOULD ATTEND COURSE:

	TOTAL	URGENT
Project Team	3,940	1,808
Project Manager	129	21
Assistant Project Manager	135	15
PM COMSO	100	50
Functional Manager	675	260
Functional Coordinator	19	1
Task Manager	467	106
Project Sponsor	45	17
Contract Manager	23	7

LISTING OF K.T.S. TO BE COVERED BY COURSE

TECHNICAL KNOWLEDGE	TOOLS AND/OR EQUIPMENT SKILLS	PERFORMANCE SKILLS (SOFT SKILLS)
Problem ID	Communication Tools	
Communication Management Plan Process	Earned Value	
Risk Management Plan Process	Periodic Reports	
Project Management Theory (Scope, Time, Cost)	Workplan	
WBS/RBS/OBS	WBS/RBS	
Procurement Management Plan Process		
Performance Measure		

TECHNICAL KNOWLEDGE	TOOLS AND/OR EQUIPMENT SKILLS	PERFORMANCE SKILLS (SOFT SKILLS)
Charter Process		
Project Status Process		
Earned Value		
Evaluations, Lessons Learned, & close-out		
Communication & distribution of Project Records		
Scheduling		

Be as specific as possible. Think of what you want a graduate of this course to know, to be able to do, their attitudes on the job, and what tools/equipment/resources they need.

TARGET AUDIENCE PROFILE

Participant Traits/Characteristics:

General Characteristics	Entry Behaviors	Style/Preferences
Project Team Members		

Note: Guidelines for completing this section are included at the back of your Course Design Package

Class Size 30

Total Throughput (Urgently Needed & Moderately Needed) 7,153

Suggested Length 32 hours

Suggested Priority for Attendance in this course: (rationale?):

Project Team

TRAINING DELIVERY OPTIONS

List your top three training delivery options and your rationale for choosing each option

OPTION ONE:

DELIVERY OPTION	RATIONALE FOR CHOOSING
Self-Teaching Packages	Very large number of students. Introductory nature of the course.

OPTION TWO:

DELIVERY OPTION	RATIONALE FOR CHOOSING
Resident Instruction - Contract	Large number of students, and need for a formalized and structured course.

THREE:

DELIVERY OPTION	RATIONALE FOR CHOOSING

NOTE: When selecting your Training Delivery Options, be sure to review the Guides for Selecting Training Methods in the Designers Handbook

H. Courses proposed for 2000-01

Serial No.	Course	Duration (hours)	First Year Number of Students
C01	Construction Academy-Environment Module Boot Camp	4	620
C07	Reading and Interpretation of Plans	16	200
C08	Labor Compliance	4	280
C09	Disadvantaged Business Enterprise Regulations	4	620
C10	Dispute Review Board	8	140
C11	Negotiation Skills	16	80
C12	Asphalt Concrete Inspection	16	160
C13	Construction Safety	8	780
C14	Comprehensive HAZ Materials Training	40	160
C15	Hazardous Material Awareness	6	500
C17	SWPPP(Storm, Water, Pollution, Prevention Plan) & Water Pollution Control Plan (WPCP)	8	480
C24	Ethics (under development)	8	560
C26	Value Engineering	40	100
C27	Critical Path Method/Scheduling	16	100
C28	COZEEP Training	4	60
C29	PCC Paving Inspection	8	160
C36	Supervisor Workshop	40	60
C37	Partnering	16	160
C39	Material Testing Certification	4	260
C40	Construction Orientation Class	8	320
C42	Advanced Contract Change Orders Review and Approval	8	80
C43	Permits and Agreements	16	80
C44	Earthquake Construction	8	200
C45	Training for Construction Managers on DRB Process	8	80
C46	Field Office Procedures for Statewide Consistency	32	180
C48	Effective Claims Repor Writing	8	180
C49	Construction Engineers Academy	24	120
C53	Instruction Techniques for Trainers (state training center)	40	80
C54	Drainage Inspection	16	240
C55	Effective Presentation Skills	16	80
C56	Progress payment Process (underdevelopment)	8	20
C58	Contract Claim Resolution	16	160
C59	Board of Review-member training	8	20
C60	Constructability	16	220
C61	Introduction to Quality Control/Quality Assurance	4	160
	(QC/QA) Specifications		
C63	Professional Engineers Review Class	80	560
C64	Resident Engineers Academy	34	160
C65	Resident Engineers Workshop	16	160
C66	AC Design & Testing Overview	8	60
C67	Traffic Control in Construction Work Zone	8	80
C68	Traffic Managemenmt	8	80
C69	Asphalt Rehabilitation Strategy	8	80
C70	PCC Rehabilitation Strategy	8	80
D01	Hydrology	24	40
D03	Fundamentals of Applied Oopen Channel Flows and the HEC-RAC Program	24	20
D05	Storm Water Management	24	400
D06	Structural Roadbed Design	72	180
D07	Designing Open Channel	24	8
D08	Project Engineer/Prject Manager Training	24	20
D09	Introducing HEC_RAS Version 2.1	16	20
D11	Value Analysis Workshop	40	320
D13	Drainage Law	8	8
D16	Techniques to Calculate Working Days	8	40
D19	Introduction to Microstation	16	1140
D20	Basic Roadway Design Parameters	8	1260
D21	Basic Supervision - Week 1	40	40
D22	Basic Supervision - Week 2	40	40
D23	Capital Cost Estimating	8	200
D24	Community Involvement	8	20
D25	Introduction to Design Senior Responsibilities - Existing Course	40	60
D26	Design Standards and Design Exceptions	8	80
D28	Microstation for Design & Delineators	32	400
D29	Geometric Design	40	780
D31	How to Develop a Biddable and Buildable PS&E Package	24	200
D34	CAiCE Design	32	780
D35	Introduction to the Highway Design Manual-D35	8	700
D37	Leadperson Workshop D37 (State Straining Center Course #405	24	40
D38	Project engineer Academy -	40	300

Serial No.	Course	Duration (hours)	First Year Number of Students
	Existing Course D 38		
D40	Contract Management	8	8
D44	Asphalt Pavement Fundamentals	24	200
D50	Concrete Pavement Fundamentals	16	80
D57	Enviornmental Short Course	4	120
ES001	Introduction to Plans and Specifications	8	120
ES004	Geophysical Test Methods	16	5
ES005	Advanced Engineering Geology	8	12
ES010	Files & Records Management	8	2
ES011	Properties of Structural Concrete	16	6
ES013	Inspection of Welded Connections	16	20
ES014	Non-DestructiveTesting using Radio Nucleidos	16	12
ES016	Rock Scaling	8	2
ES017	Driver Pile Test Methods	64	6
ES023	Supervisor Workshop	16	20
ES025	Foundation Driller Academy	16	8
ES026	New Employee Orientation	4	80
ES028	Foundation Driller Academy	12	8
ES033	Standard First Aid/CPR	8	160
ES036	Professional Licensing Preparation	8	80
ES037	AASHTO, Caltrans, and ASTM Test Methods	16	40
ES039	Professional Engineer Development Program	16	40
ES040	ESC Project Manager Outreach	16	60
ES041	Understanding ESC Office Engineer Manuals & Guides	16	40
ES045	Technical Writing	24	40
ES046	Proper Use of Caltrans Standards	8	40
ES051	Engineering Service Center Outreach	2	320
ES052	Engineering Service Center Education Programs	2	160
ES054	Contract Plans for Specification Writers	8	40
ES058	Bridge Design Correspondence Course	320	40
ES060	Oral Communication	8	40
ES061	Addenda Plan Management for Final Plans Preparation	8	5
ES062	Drafting For Project Plans	16	9
ES063	Bridge Design Academy	320	80
ES067	Structure Detailers/ Technician Processes-Series	2	60
ES068	Introduction to Highway Hydraulics	32	14
ES069	Conflict Resolution & Negotiation	8	40
ES071	Hydraulic Analysis (Bridges)	8	20
ES072	Confined Space Training & Fall Protection Training	8	40
ES073	Paint Inspection	8	40
ES075	Preparation of Caltrans Contract Special Provisions	16	40
ES076	Preparation of the Engineer's Estimate	8	40
ES077	Procedures for preparing final Caltrans construction contract documents	16	40
ES079	Critical Path Method (CPM)	16	13
ES081	Supervisor Workshop	40	20
ES082	High Strength Bolts	8	40
ES083	MS Access-Intermediate	8	20
ES083	MS Access-Beginning	8	40
ES084	Conflict Resolution	16	40
ES085	Lead Safety Paint removal & Abatement (Safety)	4	60
ES087	Falsework-by Industry & Railroad	8	40
ES088	Concrete-Admixtures, Curing, Methods & Mix Designs	16	40
ES089	Dispute Resolution	8	40
ES090	Pile Inspection & Documentation	24	120
ES091	Welding-Inspection Structural Steel &Reinforcing Steel	8	80
ES093	Ms Powerpoint, beginning	8	40
ES094	MS Exel Beginning	8	80
ES096	Time Management	8	340
ES098	Written Communication for (Bridge) Engineers	32	12
ES100	Microstation for Engineers	40	60
ES101	Load & Resistance Factor Design (LRFD) at Caltrans	40	40
ES104	Windows NT 4.0	8	60
ES105	Intermediate Microsoft Word 97	8	40
ES106	Caltrans Total Station Surveyin g Systems (TSSS)	16	80
ES107	Introducation to Microsoft Word 97	8	80
ES108	Raster Imaging Software (Descartes)	16	40
ES109	Use of Safety Procedures and Devices	4	60
ES110	Introduction to Microstation	32	40
ES112	Real Time GPS Surveying Systems	40	80

Serial No.	Course	Duration (hours)	First Year Number of Students
ES113	Post Processing GPS Data	40	9
ES116	Court Procedures	4	9
ES117	Survey Data Analysis and Adjustment	8	140
ES119	Coordinate Geometry for RW Engineers (CCaiCE) (G53611)	20	40
ES121	Caltrans Surveys RW Engineering Academy (Field Surveys for R/W-G22319)	40	120
ES123	DTM and Coordinate Geometry for Surveyors (CaiCE) (G53319)	40	60
ES124	Introducation to Microsoft Access 97	8	40
ES125	Advanced Mapping Techniques (CaiCE)	20	60
ES131	Bridge Layout using CaiCE(or IGROS)	8	80
ES134	Structural Reetaining Walls	24	20
ES135	Respirator Training Refresher	3	60
ES136	Respirator Training	8	60
ES137	Contract change order Administration	24	160
ES139	Bridge Safety	8	6
ES142	Coating Science	80	4
ES143	Corrosion Testing	40	2
ES149	Preview of Unified Building Code, __ Edition	8	8
ES150	Preview of International Council of Bldg. Officials, 11th Ed. (ICBO)	8	8
ES151	Overview of California Fire Code	8	8
ES152	Introduction to the Unified Bldg. Code for Structural Engineers	24	6
ES153	Seismic Design & Analysis of Building	20	12
ES163	HP-UX Trouble Shooting	24	2
ES166	Administering MS Windows 2000	40	9
ES167	Microstation Fundamentals	40	5
ES168	Microstation Productive	24	2
ES169	Microstation 3D	24	2
ES170	Microstation for Power Users	24	2
ES178	Deploying MS Windows 2000	4	3
ES179	Accelerating Training on Windows 2000	40	3
ES180	Asphalt Pavement Fundamentals	12	11
ES181	Asphalt Mix Design and Analysis	8	11
ES185	Ground water Flow and Modeling	16	3
ES186	Concrete Pavement Fundamentals	12	8
ES187	Addendum Procedures	8	40
ES188	Corosion Testing	40	2
ES190	Winter Construction Training	24	500
ES191	Surveying for Structure Construction Engineers	32	20
EV001	Managing Meetings	16	40
EV005	CEQA Amendments, and Court Case Studies	40	80
EV006	NEPA Amendments	24	80
EV007	Performance Appraisals	16	40
EV008	Negotiation Skill Workshop	16	20
EV009	Strategic Planning Workshop 111	24	10
EV010	Performance Measurement	16	10
EV011	Instruction Techniques for Trainers	40	60
EV014	Team Building Workshop	16	20
EV015	Diversity in the Workplace	8	160
EV016	Internet Website Training	16	20
EV020	Time Management for Managers	8	40
EV022	Asbestos Inspector Training	24	8
EV024	Effective Telephone Communication	8	20
EV025	Project Scope, Schedule, and Cost Management	16	20
EV026	Overview of CT Organization and Relationship to the Environmental Program	8	80
EV027	Asbestos Awareness Training	12	40
EV029	Public Speaking	24	120
EV030	Aerially Deposited Lead Training	4	320
EV033	Overview of CT Mapping	16	80
EV034	Basic Supervision, Week 1	40	20
EV039	Basic Supervisiom, Week 2	40	20
EV040	Negotiation Skills	40	40
EV041	Effective Meetings	24	40
EV044	Trenching and Shoring Training	8	20
EV045	Health and Safety Refresher Training for Hazardous Waste Site Workers	8	40
EV047	Biology Functional Workshop	24	100
EV048	Managing Project Teams	40	40
EV051	Environmental Laws, Regulations, and Procedures	40	120
EV052	State Discipline Process	16	20
EV055	Environmental Management Workshop	16	140
EV056	Shipley/FHWA/NHI EIS Course	40	80
EV057	Computer Training Overview of Microsoft Programs	16	160
EV058	Interviewing for Employee	16	20

Serial No.	Course	Duration (hours)	First Year Number of Students
	Selection		
EV059	Environmental Law/Regulations for Cultural Resources	12	20
EV061	Environmental Law/Regulations for Biological Resources	12	20
EV062	Environmental Law/Regulations for Hazardous Waste, Air Quality and Noise	12	20
EV063	Legislative Bill Analysis	16	20
EV064	Leadership Workshop	16	20
EV065	Caltrans Biologists State of the Art Seminar	16	40
EV067	Introduction to Caltrans Biological Studies	24	20
EV068	Wetlands Delineation	40	20
EV070	Molluse Surveys, Identification and Impacts Analysis for the Northwest Forest Plan	16	8
EV071	Aquatic Biology and Water Quality Techniques	24	20
EV072	Fairy Shrimp Identification and Survey Techniques	24	12
EV076	Hazardous Waste Contract/Task Order Management Class	8	40
EV080	Overview of Geology and Hydrogeology for Site Investigations	16	20
EV081	Health and Safety for Hazardous Waste Site Workers	40	40
EV082	Native American Coordinators Functional Workshop	20	20
EV086	Historic and Cultural Landscape Identification & Evaluation	16	13
EV090	Evaluating Historic Bridges	12	20
EV092	Cross Cultural Communication & Ethnography	24	20
EV093	Construction Safety Orientation	4	40
EV094	PS &E Specification Writing for Environmental Planners	16	160
EV095	Environmental Planners Academy	80	180
EV096	Noise & Vibration/ Transportation & Construction Induced Vibrations	8	20
EV097	Noise & Vibration/Traffic Noise Model (TNM)nBasics	24	40
EV100	Noise & Vibration/Noise Study Documentation &Reports	4	20
EV101	Noise & Vibration/ Highway Traffic noise Measurements & Instrumentation	16	20
EV102	Noise & Vibration/Caltrans Noise Analysis Protocol	4	80
EV103	Treatment of Huma Remains in Archaeological Sites	16	20
EV104	Traditional Cultrual Properties	16	20
EV105	Work Area Protection and Traffic Control	8	60
EV106	Noise & Vibration/Highway Traffic Noise Fundamentals	4	80
EV107	Noise & Vibration/Soundwall Design for Highway Engineers	8	80
EV108	Noise & Vibration/Traffic Noise Impact Screening Procedure	2	80
EV109	Noise & Vibration/Acoustic Design of Noise Barriers & Special Considerations	8	40
EV112	Geographical Information Systems for Environmental Planners	40	20
EV113	TheProject Development Process and how the environmental program fits into that process	24	240
EV114	Design, Construction and Maintenance Basics for Environmental Field Personnel	16	60
EV116	Environmental Justice and Title VI	16	60
EV117	Western Vernacular Architecture	16	20
EV119	Section 4(f) and Cultural Resources 106 Process	4	120
EV120	State Cultural Resource Laws & Regulations: CEQA, California Register, and Public Resources	8	20
EV121	Supervisors Training for Hazardous Wastee Site Workers	8	20
EV124	Advanced Section 106 of the National Historic Preservation Act: Preparing Agreement Documents	16	20
EV125	Air Quality Module 1 Carbon Monoxide Protocol	8	80
EV126	Air Quality Module 2 Ct EMFAC & Caline 4	16	80
EV128	Community Impacts Analysis Workshop	16	100
EV129	Conducting Primary Historical Research for Evaluating Historic Properties and Preparing Historic Contexts	12	14
EV130	Estimating Project Costs	23	160
EV135	Introduction to Section 106 of the	16	80

Serial No.	Course	Duration (hours)	First Year Number of Students
	National Historic Preservation Act		
EV137	Management Certificate Program	81	4
OP001	Traffic Signal Design Basics	16	80
OP005	Advanced Transportation Management System (ATMS) basics-development/application for your district	8	40
OP011	Caltrans standards, specifications, and guidelines overview	8	40
OP013	Travel forecasting modeling MINUTP software	40	12
OP015	Fiber Optics Design Basics	16	100
OP017	Travel Forecasting modeling - TRANPLAN software	40	12
OP022	Basic/intermediate/advanced Parmics Model training	48	60
OP024	Highway Design Standards for Operations Engineers	16	240
OP025	Travel forecasting modeling - EMME 2 software	40	20
OP028	Traffic Impact Analysis Report	8	240
OP032	Traffic Management Plan Preparation and review	8	160
OP034	FREQ II model training	24	60
PM01	Earned Value in Project Management	8	480
PM03	Project Change Request	8	480
PM08	Workplan Process	40	240
PM10	Risk Management	40	240
PM14	Effective Interpersonal Relations	16	480
PM17	Introduction to Project Management (Project Management 1)	32	480
PM20	Managing Meetings	8	480
PM24	Project Quality Management	24	240
PM26	Project Scope, Schedule & Cost Management	32	240
RW003	Budget Process Workshop (642 STC)	24	14
RW007	Writing Letters and Memos 662	8	80
RW009	Right of Way Academy I	80	40
RW010	Utilities Overview Module	40	40
RW017	Income Capitalization	40	20
RW019	Report Writing and Value Analysis	16	20
RW022	Sales/Cost Comparison	24	20
RW027	Property Descriptions (902)	16	40
RW030	Appraisal of Partial Acquisitions	40	20
RW040	Right of Way Academy II	40	40
RW041	Appraisal Procedures & Principles	40	20
RW042	Appraisal USPAP	8	11
RW045	Relocation Assistance-Computing RHV's (504)	8	20
RW047	Relocation Assistance-Business (502)	16	20
RW048	Relocation Assistance (501)	24	40
RW050	Effective Listening (STC 813)	8	20
RW056	Highest and Best Use, and Market Analysis (520)	8	10
RW057	Eminent Domain Law Basics for Right of Way Professionals (803)	16	20
RW060	Federal Aid (HQ SME)	4	14
RW064	Estimating and Data Sheet Module (HQ SME)	32	20
RW068	Valuing Easements	8	4
RW075	Right of Way Acquisition Principles	16	60

I. Finance Letter 3

FINANCE LETTER
Capital Projects
Continuous Skill Development Plan

A. NATURE OF REQUEST

The Department of Transportation (Caltrans) requests a permanent increase of $12.0 million and 56.1 PYs ($7.9 million in operating expense and $4.1 million in personal services) to enhance skills of its Capital Outlay Staff. This proposal would provide a level of skills development for Caltrans staff ranging from 200 hours for new employees to 60 hours for those with four or more years of experience.

B. BACKGROUND/HISTORY

In conformance with the department's Strategic Plan and with the Governor's 21st Century Training Action Team report, Developing a High Performance 21st Century Work Force for California Government, taking precedence. This proposal establishes work force development as a high departmental priority. The Governor's initiative to accelerate project delivery will put further emphasis on hiring more staff and developing their skills.

Increased funding for transportation in recent years resulted in growth in the department's Capital Outlay Program from $1.4 billion in 1996-1997, to $2.5 billion currently. To accommodate this growth, the PY commitment to Capital Outlay Support has grown from approximately 7,000 PYs in 1996-1997 to approximately 10,000 PYs in 1999-2000. Employees with fewer than three years of experience now comprise approximately 40% of Caltrans Capital Outlay Support staff. In addition attrition and migration to higher level positions attributes to 52% of staff being in their current positions for less than three years.

Engineering hires generally come to Caltrans with backgrounds in civil engineering, but not highway or bridge design. Supplemental skills development specific to State Highways and other departmental specialties is needed. Similarly, biologists, archaeologists and other environmental professionals understand their disciplines but must learn the requirements of State and Federal environmental laws. Right of Way agents must learn Federal Right of Way regulations, which differ considerably from other property transactions.

Only one university within California offers a graduate program in project management. This discipline is critical to efficient project delivery. Thus, Caltrans must develop staff in the unique features of project management.

The Program's goal is for staff to attain the technical skills needed, by providing primary level skills development in order to deliver the specialized work Caltrans is required to produce. The skills development resources needed should be equivalent to that of industry standards to reach this goal. The proposed request would provide resources to deliver a quality product in a timely,

cost effective and efficient manner as well as develop and retain a skilled knowledgeable work force.

C. STATE LEVEL CONSIDERATIONS

This proposal responds to State law, which holds the department responsible for planning, design, construction, maintenance and operation of the State Highway system. Caltrans must ensure that its employees have the knowledge, skills and tools to carry out this responsibility.

D. JUSTIFICATION

Caltrans has developed a cost estimate of its work force development plan using a bottom's up approach, based on the following process:

1. Subject-Matter Experts identified the knowledge and skills needed to produce each of the deliverables that can be required for a State Highway project. Caltrans has a "Work Breakdown Structure" (WBS) that defines each of the 491 deliverables. An example of deliverables; drainage plans, biological study or property appraisal.

2. Current knowledge and skill levels were evaluated, and estimates were developed on the number of employees that need development in each knowledge and skill. Each number was divided into those that have an urgent need and those that have a moderate need.

3. Classes were designed to address each need. Each design listed the class title, learning outcomes, WBS deliverables, types of employee who need the class, and estimated audience size (subdivided into an urgent and moderate need). A total of 579 designs were completed. 337 of these classes are already available. 242 need to be developed. Cost estimates were prepared for the development and delivery of each class.
4. Classes were prioritized and approved by each technical program manager, and a plan was developed for Fiscal Year 2000-01. This would provide 303 high-priority classes to meet only the most urgent needs.

The implementation of this plan will be accomplished by:

- establishing a skills development support group and structure,
- making classes accessible from any location and at any time,
- use of adult-learning principles,
- cost effective skills development design class process, and
- measuring effectiveness.

Based on the above analysis, the requested $6.7 million in operating expense, in addition to the $3.1 million base, will allow for the instruction of 162 classes and the development and instruction of an additional 141 classes. Also requested are 53.0 PYs for instructor time, course design, contract administration and course evaluation at a cost of $4.6 million in personal services and related operating expense.

PYs were determined based on the type and number of hours per course, times the number of hours needed to develop and instruct the course. The number of total student class time hours needed is 763,000 and is consistent with estimates of student hours in a survey by the University of California at Berkeley of similar public and private engineering entities. It would provide approximately 200 student hours for employees with less than one year of service, ranging to 60 student hours for those with more than four years of service. The increase for skills development is approximately 5% of the Programs current budget.

Administration Support Services

The significant increases to Caltrans' support and program resources do not allow the associated administrative support services to be absorbed within the Administration Program. Adequate administrative support services are essential to the success of Caltrans' programs. Caltrans needs to be able to recruit, test, hire and train the staff necessary to deliver its programs, manage its facilities, and make payments to employees, vendors and contractors within legally mandated time frames. In addition, Caltrans must maintain a safe working environment for both field and office personnel, conduct audits and workers compensation investigations, and maintain computer systems adequate to allow for project design, and internal and external communications. Caltrans is responsible for developing and monitoring contracts and cooperative agreements, providing legal services, and monitoring and controlling project workload and expenditures.

In order to adequately support the workload increases in the Capital Outlay Support Program, an increase is requested in the amount of 3 PYs and $678,000 in those administrative areas which are directly tied to the increase in the Capital Outlay Support Program workload. Administrative work activities were identified for each administrative area, and standards were developed that directly relate to workload increases in the Capital Outlay Support Program.

Information Systems and Service Center

The tool most often identified, as a means of improving and broadening business services is technology. As Caltrans grows, its need to be augmented with information technology baseline resources also grows. These costs are manifesting themselves in the form of additional Local and Wide Area Network capacity, that links Caltrans employees, decision makers, and local government and business partners. Caltrans' expanding technology requirements for e-mail system, standard desktop software, intranet/internet capability are also exhibited in the needs for software licenses, maintenance and support costs.

In order to adequately support the escalating cost of doing business in an increasingly intense information environment, an augmentation total of $113,000 is requested of which $84,217 is one-time costs and $28,783 is permanent in the EDP line item. Information technology needs were identified and standards were developed that relate directly to the personnel years requested.

E. ANALYSIS OF ALL FEASIBLE ALTERNATIVES

- Do nothing. Continue at the level of skills development currently provided to Caltrans staff. Over time, staff would arrive at the desired level of expertise and problems with the development of biddable and buildable projects plans will continue.

- Implement continuous skill development that is needed to develop biddable and buildable project plans. This would allow use of current adult learning-centered technology, bring inexperienced staff to full productivity and maintain staff expertise in a period of rapidly changing engineering technology.

F. TIMETABLE

July 1, 2000.

G. RECOMMENDATION

Approve request of 56.1 PYs/$12.0 million to implement the Capital Projects Continuous Skill Development Plan.

J. Capital Project Skill Development Team

The following people made significant contributions to the Skill Development Plan. Those listed in *italics* worked on the plan for the entire period from November 1998, when the Charter was signed, until May 2000, when Governor Gray Davis presented the plan to the Legislature.

Project Sponsor	John A. Boda
Executive Review Team	Bob Coleman, *Brent Felker, Brian Smith, Bob Buckley, Denny Shields, John Allison,* Larry Hoffart
Sponsor's Representative (responsible for day-to-day direction of the project)	Nigel Blampied
Project Manager (responsible full-time for keeping the project within scope, on time and within budget)	Phase 1 - November 1998 to August 1999: Hossein Rostam Phase 2 - August to November 1999: Nigel Blampied Phase 3 - December 1999: Gene Berthelsen Phase 4 - January to July 2000: Wayne Schnell
1998 Strategic Plan (key planning document – see Section 3.2)	Judith MacBrine
Core Project Team (This team met monthly throughout the project lifespan. It was responsible for coordinating the project. Members of this team did a large part of the work on the project.)	Construction: Imad Abed Al-Rahim, JoAnn Rizzardo, Michael Kissel, Osama Hassoun. Design: Don Roberts, Gene Berthelsen, Joyce Hirano, Karla Sutliff, Kevin Herritt. Engineering Services: *Norman Root*, Bob Galante, Diane Zuhlke, Gary Garofalo, Henry Brimhall, Judy Guerrero, Luke Wilson, Mickey Horn. Environmental: *Barbara McDonnell, Rich Weaver.* Project Management: Amir Taba, Arjun Joseiph, Hossein Rostam, James Davis, Michael Drouin, *Nigel Blampied*, Omar Elkhayat, Rob Richmond, Terry Murphy, Wayne Schnell. Right of Way: Eric Blankenburg, Gary Horn, Greg Lundblad, Laura Hameister, Lorrie Wilson, Xiomara Balladares. Traffic Operations: Mark Siroky, Raul Sanchez, Wayne Henley.

Staff Development: *David Polster*, Debra Hoffmann, Larry Hoffart.

Adult Education Consultants: Gerald Linnins, Steven Halley, Patricia George, Susan Dupre, Dana Halley.

Phase 1: Need Identification
November 1998 to August 1999

Construction: Imad Abed Al-Rahim (Team Leader), Leticia Alvarez, Hossein Amrbar, Robert (Craig) Anderson, Tom Buchanan, Dan Ciacchella, Edsel Der, Maurice El Hage, Lee Haber, John Hancock, Osama Hassoun, Vern Jones, Abu Kamara, Charly Kotek, Tony Ordway, JoAnn Rizzardo, Victor Salazar, Vijay Syal, Kerry Theran, James Wilcenski.

Design: Don Roberts (Team Leader), Jim Alessi, Aline Antaramian, Ross Cather, Han Chen, Pete Conn, Matt Cugini, Greg Damico, Art Dao, Chuck Davis, Malcolm Dougherty, Claudia Espino, Greg Farr, Jose Gomez, Gene Gonzalo, Katia Greeve, George Hayakawa, Kevin Herritt, Joyce Hirano, Craig Holste, Dave Horsfall, Matt Htoo, Douglas Jones, Larry Jones, Joon Kang, Roger Kao, Bari Khaliki, Bill Koval, Paul Lambert, Mark Lancaster, Dave Lawrence, Jim Lawrence, Orlance Lee, Rodrick Lee, Paul Mai, Robert Navarro, Tam Nguyen, Arlissa Pang, Mary Payyappilly, Randy Perkins, Greg Ramirez, Amir Sanatkar, William Schwarz, Gary Slater, Dave Stebbins, Pamela Suszko, Norm Suydam, Heidi Sykes, Karen Tatman, David Thomas, Shar Van Voorhees, Milt Watanabe.

Engineering Services: , Norman Root (Team Leader), Jocelyn Almeida, Robert (Craig) Anderson, Jim Appleton, Cathy Avila, Richard Barlow, Paul Benson, Clem Bomar, Glen Boulware, Mel Brown, Robert Call, Douglas Cargile, John Castro, Javier Chavez, Rudy Chong, Hal Cole, Bruce Cox, Gordon Danke, Jim Darnell, David DeFoe, Peter Dirrim, Bob Doty, Joe Esfandiary, Henry Figueroa, Carol Fisher, John Fundus, Robert Galante, Gary Garofalo, Mitch Gipson, Kelly Holden, Ernie Holt, Rob Isakson, Kathy Jacinto, Ken Jackura, Nina Kwok, Rick Land, Ed Leivas, Ron Maasberg, Hooshang Mehrshahi, Jon Mehtlan, Roy Mode, Brian Mori, Richard Morrow, Dave Neunzig, Rich Newell, Ruth Noguchi, Doug Parks, Hao Phan, Rod Prysock, Dave Quong, Doris Rawlings, John Robertson, Jean Robins, Scott Rodrick, Robin Rogerson, Johnny Rohrer, Jesse Sandhu, Steve Schoff, Eleanor Smith, Tony Spillane, Phil Stolarski, Rob Stott, Dave Stow, Roland Swirsky, Dan Thomas, Kevin Thompson, Alan Torres, Dolores Valls, Joan Van Velsor, Mike Wagner, Luke Wilson,

Deanna Wiltse, Walt Winter, Peter Witfield, Dick Wood, Roy Yokoi.

Environmental: Rich Weaver (Team Leader), Margaret Buss, Harold Hunt, Lupe Jimenez, Keith Jones, Greg King, Julia Turney, Gary Winters.

Project Management: James Davis (1999 Team Leader), Karl Dreher (1998 Team Leader), Michael Bauer, Lenka Culik-Caro, Rick Guevel, Jim Hammer, Allan Kosup, Andy Miller, Mike Okey, Rob Richmond, Lanru Saadatnejadi, David Salladay, Richard Weaver.

Right of Way: Xiomara Balladares and Andy Miller (Co-Team Leaders), Kathy Anderson, Mark Avila, Robert Bachtold, Barbara Baernstein, Debra Baker, Mike Baker, Bill Balmain, Marta Bayol, Louis Birdwell, Betty Bobosik, John Brown, Duncan Bush, Sarah Contreras, Jim Courtney, Barry Cowan, Maria Cresci, Jim Delarosa, Doris Dominguez, Judy Downer, Jeannette Drummond, Nick Dumas, Sue Dunn, Joanne Einhorn, Susan Ellis, Linda Emadzadeh, Harold Emerson, Elizabeth Engle, Brian Finkbeiner, Renata Frey, Tom Ganyon, Fred Gay, Debbie Gebers, Sunny George, Shelly Gillin, Jim Grady, Lark Granger, Terry Haines, Jim Hall, Laura Hameister, Georgia Hannel, Carol Hanson, Wayne Harrold, Lisa Harvey, Yoshiko Henslee, Michael Hoover, Gary Horn, John Hotchkiss, Nancy Hueske, Dave Johnson, Peggy Jung, Gene Kaita, Sharon Kashuba, Don Kay , David Keba, Paul Kenny, Billy Kent, Linda Kibler, Brad Kight, Laura King, Pat Kipling, Rosa-Lynne Kondor, Joyce Lane, Willie Langie, Miranda Law, Betty Louie, Greg Lundblad, Diane Maletta, Bruce Marshall, Joe Martin, Michael McCue, Anthony McDowell, Tom McVarish, Vicci Messer, Geri Moore, Ken Moore, Michael Moore, Terry Moore, Debbie Moreno, Suzette Musetti, Andy Nierenberg, Linda Niver, Ruben Nunez, Joseph O'Rourke, Shirley Parker, Ralph Perry, George Pink, Rebecca Poucel, Steve Radman, Bill Rettke, Cheryl Revell, James Richards, Robert Richardson, Gene Rizzardo, Michael Rodrigues, Ricky Rodriguez, Rudy Ryan, Richard Saretsky, Janet Schaffer, Kristin Schober, Susan Sears, Suzette Shellooe, David Sherman, Ester Sherman, Mark Shindler, Ren Simmons, Pati Smith, Paul Solosky, Gary Spencer, Richard (Bob) Stanley, Larry Steelman, Larry Stevens, Donald Stratton, Brian Sussan, John Towers, Rita Velasco-Diaz, Mark Weaver, Barbara Webb, Lynn White, Caron Whitford, Ruth Williams, Murray Wilson, Michael Yarbrough.

Traffic Operations: Raul Sanchez (Team Leader), Michael Church, Gary Kevorkian, Mark Siroky, Martha Styer.

Adult Education Consultants: Steven Halley, Patricia George, Susan Dupre.

Phase 2. Need Quantification
August to November 1999

Construction: Imad Abed Al-Rahim (Team Leader), Nabil Fraywat, Lee Haber, Osama Hassoun, Richard McCafferty, Shirish Mistry, Tony Ordway, Charles Suszko, Christine Valle.

Design: Gene Berthelsen.

Engineering Services: Norman Root (Team Leader), Cheryl Poulin, Luke Wilson.

Environmental: Rich Weaver (Team Leader), Margaret Buss, Harold Hunt, Lupe Jimenez, Keith Jones, Greg King, Barbara McDonnell , Julia Turney, Gary Winters.

Project Management: Omar Elkhayat (Team Leader), James Davis, Allan Kosup.

Right of Way: Gary Horn, Greg Lundblad.

Traffic Operations: Wayne Henley (Team Leader), Raul Sanchez, Mark Siroky, Michael Church, Gary Kevorkian, Kim Nystrom, Martha Styer.

Adult Education Consultants: Steven Halley, Gerald Linnins.

Phase 3. Proposed Course list
December 1999

Integration and Cost Estimate: Nigel Blampied, Gene Berthelsen, Steven Halley, Gerald Linnins, Omar Elkhayat.

Construction: Imad Abed Al-Rahim, Tony Ordway.

Design: Mary Beth Herritt, Dennis Jacobs, Brian Lee, Donald Roberts.

Engineering Services: Bob Galante, Gary Garofalo, Sue Hida, Bill Jackson, Cheryl Poulin, Norman Root, Luke Wilson.

Environmental: Margaret Buss, Greg King, Harold Hunt, Lupe Jimenez, Keith Jones, Julia Turney, Rich Weaver, Gary Winters.

Project Management: Omar Elkhayat, Paul Gennaro, Jim Hammer, Amir Taba.

Right of Way: Eric Blankenburg, Susan Ellis, Greg Lundblad, Lorrie Wilson.

Traffic Operations: Michael Church, Gary Kevorkian, Martha Styer.

Adult Education Consultants: Steven Halley, Gerald Linnins, Dana Halley.

Phase 4. Implementation Plan
January to July 2000

Budgets: Ileen Jellison, David Saxby, Lori Bodhiprasart, Blanca Rodriguez, Michelle Sommer.

Construction: Imad Abed, Michael Kissel, John McMillan.

Design: Don Roberts, Karla Sutliff.

Engineering Services: Henry Brimhall, Robert Cullen, Norman Root, Luke Wilson.

Environmental: Margaret Buss, Gregg Erickson, Harold Hunt, Lupe Jimenez, Keith Jones, Greg King, Barbara McDonnell , Julia Turney, Rich Weaver, Gary Winters.

Facilities: Steven Alston, Bob Barr.

Information Systems Service Center: Daniel Milhoan, Bill Saunders.

Personnel: Lorraine Cozad, Patty Wing.

Project Management: Nigel Blampied, Grisel Bybee, Omar Elkhayat, Rita Encinas, Kathy Koontz, Terry Murphy, Blanca Rodriguez, Wayne Schnell, Amir Taba, Nancy Young.

Right of Way: Eric Blankenburg, Gary Horn.

Traffic Operations: Wayne Henley, Kim Nystrom, Martha Styer.

Adult Education Consultants: Steven Halley, Gerald Linnins.

Project Support
Numerous people provided support services for the project through its life. Those listed here had a particular influence on the success of the project.

Accounting: Marianne Larsen.

Audits: Juanita Baier, Susan Bransen, Thi Huynh, Dan Spencer.

Contracts: Hely Jones, Chiyo Nakashima, Peggy Schlenker.

Golden State Museum: Diane Masters.

Project Management: Michael Drouin, Patty Fong, Arjun Joseiph, Larry Lopez, Lam Nguyen, Marta Rivas-Mead.

Reprographics: Jose Escobar.